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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,359	12/30/2003	Valery M. Dubin	110348-135103	7770

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SCHWABE, WILLIAMSON & WYATT, P.C.
PACWEST CENTER, SUITES 1600-1900
1211 SW FIFTH AVENUE
PORTLAND, OR 97204

EXAMINER	
QUACH, TUAN N	

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 02/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/748,359	DUBIN ET AL.	
	Examiner	Art Unit	
	Tuan Quach	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) *9-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 21-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *06/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Applicant's election of group I, product claims 1-8 and 21-24 in the reply filed on February 7, 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). It is noted for the record that as admitted by applicant, claim 16 was erroneously recited a semiconductor device but was intended by applicant to be a process claim, i.e., the preamble thereof should read as a method; accordingly, applicant admitted for the record that claim 16 is not a product claim and that the preamble was a mistake and should read as a method claim and thus was properly grouped in the process group II, claims 9-20. Applicant is required to make the necessary change, i.e., to make the necessary correction it admitted since claim 16 now still reads as a semiconductor device despite applicant's admission of error since applicant did not make the correction.

Rejection 35 U.S.C. 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 3, 5, 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Marathe.

Marathe (6,476,498) teaches regarding claim 1, a semiconductor device comprising a substrate 216, a dielectric layer 212/210 over the substrate, a damascene interconnect structure 232/234/236 defined in the dielectric layer, a barrier layer 232 deposited over the dielectric layer and within the damascene interconnect structure, the barrier layer within the damascene interconnect structure being tapered. See column 5 lines 20-68, Fig. 3. Regarding claim 2, the barrier being thinner toward an edge and thicker toward the bottom is also shown, e.g., portion 231. Regarding claim 3, the via or trench is shown in the openings in dielectric layer. Regarding claim 5, the different barrier materials include well known refractory materials such as tantalum, tungsten, etc. Regarding claim 8, the use of low dielectric is also shown, e.g., column 6 line 52.

Rejection 35 U.S.C. 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marathe takne with Tu et al. or Aoyama et al.

The reference as applied above does not show the cap layer.

Tu et al. 6,566,250 teaches cap 20C over the copper plug. See column 5 line 45-60. Aoyama et al. 5,592,024 teaches the use of cap 7 over the interconnect for providing protection. See column 11 line 20 to column 12 line 22. It would have been obvious to one skilled in the art to have provided a capping layer to protect the interconnect as taught by Tu et al. or Aoyama et al.

Claim 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marathe taken with Farrar.

Marathe is applied as above and does not recite all the materials in claim 5, thicknesses in claims 6 and 7, the silicon oxide in claim 8.

Farrar 2002/0024150 teaches the various barrier materials including refractory materials including the selection of appropriate materials, the appropriate thickness for the barrier, and the conventional dielectric material such as oxide. See [0051].

It would have been obvious to one skilled in the art to have employed the well known alternative barrier materials, to have selected and optimized the appropriate thickness and to have employed silicon oxide as dielectric material, as claimed in these claims since such correspond to well known materials and dimensions as evidenced by

Farrar. Official notice is further given regarding well known alternative barrier materials not expressly recited.

Claims 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marathe taken with Farrar and McCown et al.

Regarding claim 21, Farrar above is applied as above and further teaches conventional application of damascene interconnect for connecting to microprocessors including the bus 452, the microprocessors. See [0066] and Fig. 24.

Marathe above is applied as above regarding the damascene having tapered barrier.

It would have been obvious to one skilled in the art in practicing the Marathe invention to have applied into microprocessor interconnection since such is conventional and advantageous applications as evidenced by Farrar. Conversely, it would have been obvious to have provided in Farrar the tapered barrier as taught by Marathe to obtain the advantages cited, column 5 lines 53-64. It would have been further obvious to provide the connection to a network interface since such is well known and obvious as evidenced by McCown et al., 2002/0184490, [0025], wherein microprocessor 200B communitcates through device bus 202B and network interface 206B.

Regarding claims 22-24, these claims are further unpatentable since they recite the product by process features and since a "product-by-process" claim is directed to the product per se, no matter how actually made. See *In re Thorpe et al., 227 USPQ 964 (CAFC, 1985)* and the related case cited therein which make it clear that it is the

final product per se which must be determined in a "product-by-process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product-by-process" claims or not. As stated in *Thorpe,*

> "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted)

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chen et al. 6,518,166, Denning et al. 2003/0203615, Agarwal 6,537,912), Rozbicki et al. 6,642,146, Lu et al. 6,624,066, Huang et al. 2004/0127014 are made of record

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Quach whose telephone number is (571) 272-1717. The examiner can normally be reached on M - F from 8:30 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1562.

T. Quach

Tuan Quach
Primary Examiner